ORIGINAL ARTICLE

Physical Therapy Journal of Indonesia (*PTJI*) 2022, Volume 3, Number 2: 49-53
E-ISSN : 2722-6034 ; P-ISSN : 2722-0125

Overview of Musculoskeletal Disorders in Undergraduate Students

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ABSTRACT

Background: Musculoskeletal disorders are defined as complaints or disorders that cause discomfort to the musculoskeletal system. During lecture activities, students are mostly in a static posture. Static and repetitive muscle loading when sitting for a long period can cause muscle fatigue due to the accumulation of lactic acid. Besides, it produces discomfort or pain in the musculoskeletal system. The purpose of the research is to describe an overview of musculoskeletal disorders in undergraduate students of the Bachelor and Professional Program of Physical Therapy Faculty of Medicine Udayana University during the lecture.

Methods: The method of this research is descriptive-analytic with a cross-sectional, which has been carried out from October to November 2021. This research used a total sampling technique. The participants were undergraduate students of the Bachelor and Professional of Physical Therapy Program, College of Medicine, Universitas Udayana, with a total of 196 participants who met the established criteria. Researchers measured musculoskeletal disorders using a Nordic Body Map (NBM) questionnaire. Analysis of research data using univariate analysis, namely age, gender, body mass index, study period, duration of the study, and musculoskeletal disorders.

Results: The results showed that musculoskeletal disorders were mostly complained of by students, namely the waist 61.7%, then the back 59%, followed by complaints in the lower neck 53.6% and upper neck 47.4% while the lowest complaints occurred in the left leg with a percentage of 5.6%.

Conclusion: A total of 177 (90.3%) students had musculoskeletal disorders during lectures and 19 (9.7%) did not experience musculoskeletal disorders during lectures, and 94.4% had a low risk of musculoskeletal disorders. The risk of low musculoskeletal disorders can be interpreted as not requiring improvement.

Keywords: Musculoskeletal Disorders, Students, Lecture.

Cite this Article: Agatha, S., Thanaya, S.A.P., Sundari, L.P.R., Nugraha, M.H.S. 2022. Overview of Musculoskeletal Disorders in Undergraduate Students. *Physical Therapy Journal of Indonesia* 3(2): 49-53. DOI: 10.51559/ptji.v3i2.54

BACKGROUND

During lecture activities, students are mostly in static postures and unnatural body positions, such as bending over when writing.[1] Muscle contractions become static if the sitting position is done continuously. Static and repetitive muscle loading obstructs blood flow to carry out aerobic metabolic processes because of insufficient oxygen supply. Furthermore, skeletal muscles can experience fatigue due to the accumulation of lactic acid.[2] This can cause discomfort or pain in the musculoskeletal system.[1]

Complaints or disorders of the muscles, ligaments, joints, and skeletal system caused by body position that is not ergonomic, especially when done for a long time, are called Musculoskeletal Disorders (MSDs).[3] Musculoskeletal-related health disorders are a health problem that affects almost everyone in the world and were the main cause of disability in four of the six WHO regions in 2017.[4]

Complaints felt by someone with a musculoskeletal disorder range from mild complaints to very sick.[3] Early musculoskeletal disorders include pain, tingling, numbness, stiffness, swelling, shaking, sleep disturbances, and burning sensation.[5] Musculoskeletal disorders can be exacerbated by static postures such as sitting for long periods.[6] Pain in the musculoskeletal system, if it is often ignored, will accumulate and develop over time, so it will be difficult for physiotherapy students themselves in the future.[1]

Research conducted by Desai and Jain (2020) involving 250 physiotherapy students in India reported that 70.1% of the total population experienced musculoskeletal disorders. The most common locations of pain were the lower back (177 people), neck (167 people), shoulders (114 people), and upper back (102 people).[1]

Globally, there has been an increase of 68% in years of life with disability associated with musculoskeletal disorders from 1990 to 2015.[7] More than 21% of disabilities worldwide are caused by musculoskeletal disorders, which half of the total burden of disability (49.6%) is caused by low back pain and 20.1% due to neck pain.[8] Approximately 20-33% of people live with painful musculoskeletal

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Received : 2022-10-05
Accepted : 2022-11-18
Published : 2022-12-15

disorders.[4] The purpose of this research is to find out the overview of musculoskeletal disorders during the lecture, especially for undergraduate students of the Bachelor and Professional of Physical Therapy Program, College of Medicine, Universitas Udayana.

METHODS

This study used a descriptive-analytic method with a cross-sectional approach. The sampling technique of this research was total sampling. The research was conducted online from October 28th to November 19th, 2021. Previously, this research had obtained permission from the Ethics Commission of Udayana University. The participants met the inclusion criteria, namely undergraduate students of the Bachelor and Professional of Physical Therapy Program, College of Medicine, Udayana University, who were still active and willing to become participants, aged 18-23 years, and understood the Indonesian language and research instructions. Meanwhile, the exclusion criteria were having a history of comorbidities, having a contact injury in the last month, and having surgery in the last year, which was known through filling out the questionnaire. The sample size was 196 students.

Before conducting the research, the students were explained how the research would be conducted. Students who agreed to be the participants were asked to sign an informed consent, fill out an online research questionnaire consisting of personal data, study duration, study period, and a Nordic Body Map (NBM) questionnaire to evaluate musculoskeletal disorders felt by the participants. The NBM comprises a body map to determine which muscle area is experiencing complaints and the level of skeletal muscle complaints. The musculoskeletal system is mapped into 28 sections ranging from 0 to 27 on both the right and left sides of the body. Each body part was assessed for pain using a Likert scale: 1) No pain: no complaints of pain or no pain at all felt, 2) Slight pain: there was little complaint or pain in the skeletal muscles, 3) Pain: the presence of complaints of pain or pain in the skeletal muscles, 4) Very sick: complaints of very sick or very painful skeletal muscles. The accumulated score from each body part was classified into the level of risk of musculoskeletal disorders as follows: 28-49 (low risk), 50-70 (moderate risk), 71-91 (high risk), and 92-112 (very high risk).[9]

The data were analyzed univariately using descriptive statistics in Statistical Package for the Social Sciences (SPSS) version 16.0 software to find out a general description of the frequency and percentage of participants' characteristics such as age, study period, gender, body mass index (BMI), duration of the study, and musculoskeletal disorders.

RESULTS

Based on Table 1, most participants were 19 years old, as many as 55 participants (28.1%) with an average of 19.64 years. Fifty-four participants (27.6%) underwent a study period of 3 years, with an average of 2.46 years. Participants' genders were 152 females (77.6%) and 44 males (22.4%). The BMI was dominated by the normal category, with as many as 127 participants (64.8%). Eighty-three participants (43.9%) studied 6 hours a day.

Based on the diagram in Figure 1, it can be seen that the most musculoskeletal disorders which students complained about were the waist (121 participants or 61.7%), back (117 participants or 59%), lower neck (105 participants or 53,6%), upper neck (93 participants or 47.4%), and buttocks (87 participants or 44.4%). At the same time, the lowest complaint occurred in the left leg (11 participants or 5.6%). Based on Table 2, it was found about 185 participants (94.4%) had low-risk musculoskeletal disorders, followed by a moderate risk for 9 participants (4,6%).

DISCUSSION

One of the risk factors for musculoskeletal disorders is age.[10] With increasing age, there is an increased risk of experiencing musculoskeletal disorders. This is related to a decrease in muscle and bone stability due to bone degeneration.[11] Based on Pramesti (2022), musculoskeletal disorders begin at the age of 35-65. In this age range, physical activities generally decrease, so oxygen consumption also decreases. This triggers biological changes in muscle strength and endurance, which result in an increased risk of musculoskeletal disorders.[12] The results of this study showed that the majority of participants only experienced a low risk of musculoskeletal disorder. The age factor can affect the results because the participants in this study were 18-23 years old. Gender factors can influence the results, where women have a higher risk of musculoskeletal disorders than men[11,13], but this theory was not compared and tested specifically in this study.

Another factor in the occurrence of skeletal muscle complaints is body weight. Body size can affect the balanced condition of the frame structure when it receives loads. Complaints in skeletal muscles can occur as a result.[11] But on the body mass index, results showed that most of the participants had normal body mass index. However, the results of most participants with a low risk of

musculoskeletal disorders could also be influenced by other factors, which as prolonged sitting posture during the lecture.[14]

Prolonged sitting position affects the occurrence of musculoskeletal disorders.[15] When sitting, the muscles, especially those around the back, waist, neck, and shoulder, work statically due to disturbances in the brain blood flow, so the oxygen supply to the muscles is insufficient to carry out aerobic metabolic processes.[16] Inhibition of the aerobic metabolic process causes a build-up of lactic acid, which can cause fatigue of skeletal muscles that is felt as muscle pain.[2]

All participants had a study duration of ≥ 6 hours a day. Ding's research (2020) tested muscle fatigue or discomfort in a sedentary sitting. The results showed that the trapezius and latissimus dorsi muscles produced symptoms of fatigue or discomfort after only 40 minutes of sedentary work.[17] Pramana and Adiatmika (2020) conducted a study involving 126 College of Medicine, Udayana University students, finding a positive and significant correlation between a sitting position and lower back pain. Complaints of lower back pain are more easily experienced by someone sitting position deviating from an ergonomic position.[18] These results are supported by another study involving 159 participants with an average study duration of 6-8 hours, reporting a significant correlation between a sitting position and lower back complaints. Not ergonomic sitting position correlated with disorders of pain in the lower back.[19] Furthermore, 4 hours duration of sitting in a day correlated with the occurrence of musculoskeletal disorders.[2]

This study's body parts experiencing musculoskeletal disorders were quite similar to other studies. The research conducted by Tambun (2021) showed that musculoskeletal disorders were most common in the waist, with as many as 34 people (61.8%), 33 people (60%) in the upper neck, and 25 people (45.5%) lower neck.[20] The majority of participants had a low risk of musculoskeletal disorders. The risk of musculoskeletal disorders is related to corrective action. There is no need for corrective action at the level of musculoskeletal risk belonging to the low category. However, it is necessary to improve the work position and attitude as soon as possible if results with a high severity level are found.[21]

This study has some limitations, mainly that there has yet to be a further study about body posture while undergoing lectures and distance learning lessons. Moreover, there may be a bias in scoring the questionnaire because the perception of pain level felt between participants may differ.

Table 1. Distribution of Respondents' Characteristics.

Variable	Frequency(n)	Percentage (%)	Mean±SD
Age			
18	39	19.9	19.64±1.171
19	55	28.1	
20	49	25.0	
21	45	23.0	
22	7	3.6	
23	1	0.5	
Study Period			
1 year	47	24.0	2.46±1.078
2 years	53	27.0	
3 years	54	27.6	
4 years	42	21.4	
Gender			
Male	44	22.4	
Female	152	77.6	
Body Mass Index			
Very Thin	14	7.1	
Underweight	22	11.2	
Normal	127	64.8	
Overweight	14	7.1	
Obese	19	9.7	
Duration of Study (per day)			
6 hours	86	43.9	
7 hours	47	24.0	
8 hours	50	25.5	
> 8 hours	13	6.6	

Table 2. Distribution of Musculoskeletal Disorders Risk.

Variable	Frequency (n)	Percentage (%)
Risk of Musculoskeletal Disorders		
Low	185	94.4
Medium	9	4.6
High	1	0.5
Very High	1	0.5

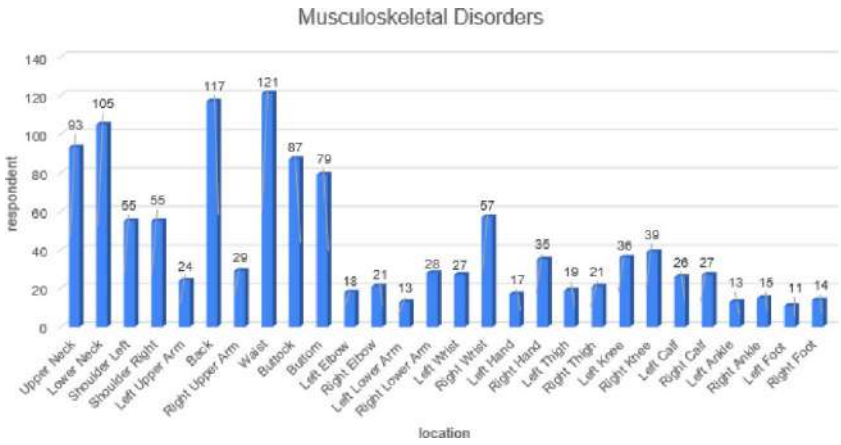

Figure 1. Distribution Diagram of Musculoskeletal Disorders.

CONCLUSION

The majority of students had musculoskeletal disorders but were categorized as low-risk. The risk

of musculoskeletal disorders in the low category can be interpreted as not requiring corrective action. During lectures, students are advised to sit in an ergonomic position to prevent and minimize musculoskeletal disorders. Using good learning support facilities during lectures, such as using a seat equipped with back support, using a table whose height can be adjusted, and stretching between breaks when sitting for long periods to reduce discomfort in the musculoskeletal system.

ETHICAL CLEARANCE

This research has been approved by the Research Ethics Commission of the College of Medicine, Udayana University/Sanglah General Hospital Denpasar. Information on Ethical Eligibility/Ethical Clearance with number 1784/UN14.2.2.VII.14/LT/2021. We obtained informed consent that the sample had been approved before conducting the study.

CONFLICT OF INTEREST

This research has no conflict of interest.

ACKNOWLEDGEMENT

The writing of this journal must be connected to the help of various parties. Therefore, with all humility, the author would like to express his deepest gratitude to all parties involved in the process of this research.

FUNDING

No funding for this study.

AUTHOR CONTRIBUTIONS

SA compiled the study design, data collection, and data analysis and drafted the manuscript; SAPT, LPRS, and MHSN participated in the literature search, drafting, and revising of the manuscript. All authors have read and approved the final version of the manuscript.

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